

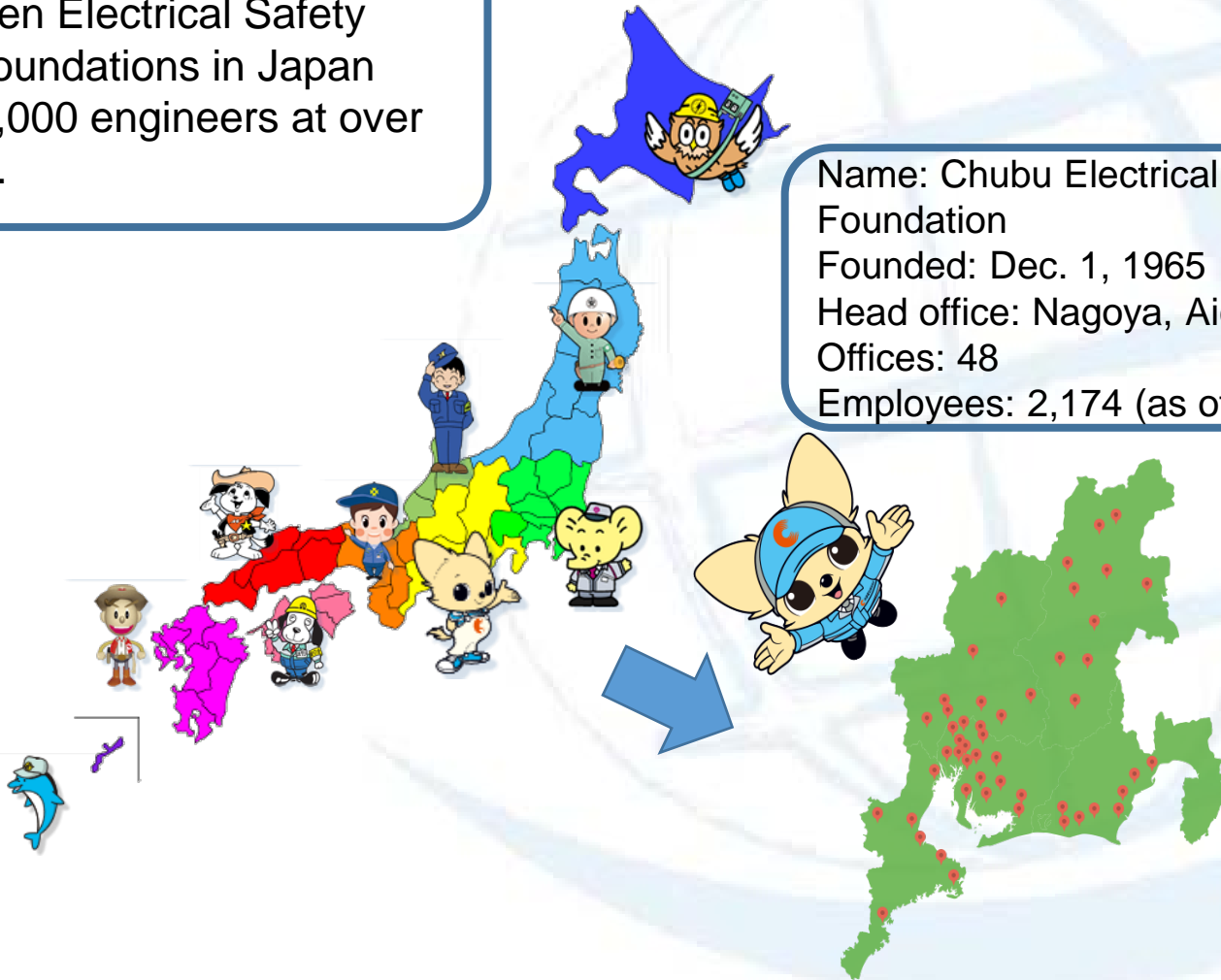
Deterioration and its Countermeasures on Electrical Equipment in Japan

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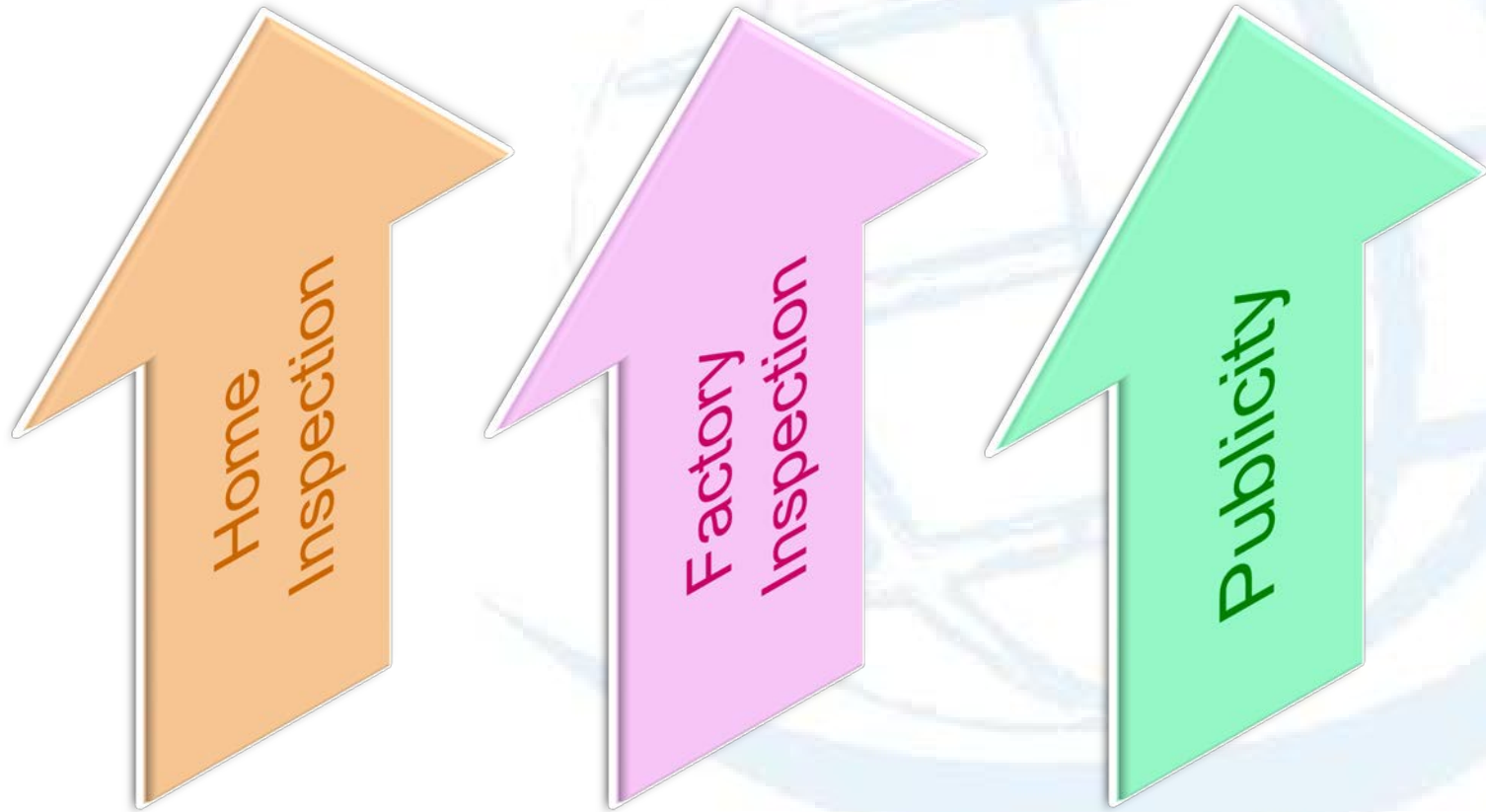
Electrical Safety Services Foundations nationwide

There are ten Electrical Safety Services Foundations in Japan with over 7,000 engineers at over 350 offices.

Name: Chubu Electrical Safety Services Foundation
Founded: Dec. 1, 1965
Head office: Nagoya, Aichi prefecture
Offices: 48
Employees: 2,174 (as of Apr. 2017)



We support safety in electricity use with our technical, organizational, and mobility capabilities.



Regulations in Japan

Type	Voltage range	Security inspection system	Checkups and frequency	Nationwide users ^{*2} (as of Mar. 31, 2016)
Low-voltage	600 VAC or lower 750 VDC or lower	No special requirements (Exceptions apply)	Inspected by registered investigating agencies (Once every four years. *Exceptions apply)	—
High-voltage	Greater than 600 VAC and 7000 VAC or lower Greater than 750 VAC and 7000 VAC or lower	Must assign a chief electricity engineer (May be contracted to external contractor *1)	Checkups by the chief electricity engineer (Basically once a month)	845,368
Special high-voltage	Greater than the above voltages	Must assign a chief electricity engineer	Same as above	9,268

Number of safety inspection contracts (as of Mar. 31, 2017)

Contracts at Electrical Safety Services Foundations nationwide	Contracts at the Chubu Electrical Safety Services Foundation
Roughly 390,000	Roughly 70,000

The ten Electrical Safety Services Foundations nationwide contract roughly half of all high-voltage facility checkup contracts, and the Chubu Electrical Safety Services Foundation holds the second largest number of contracts among all Electrical Safety Services Foundations.

*1: The management technician, who meets specific criteria and may be either an individual or a corporate entity such as an Electrical Safety Services Foundation, may fulfill the security inspection responsibilities of the licensed electrical engineer whose assignment is mandatory.

*2: From the data on "National total of installed non-utility electric installations" published by the Ministry of Economy, Trade and Industry.

Our operations (Factory inspections)

We contract business from customers who possess "non-utility electric installations" as defined in the Electric Utility Industry Law, and carry out safety inspections and management of electrical facilities.

- Review of electrical facility designs, checkups during construction, and inspections after completion
- Monthly, annual, and special checkups
- Response to electrical accidents and failures (24-7)
- Electrical safety training, and consultation services on streamlining electricity use
- Support for application submissions to competent government agencies, and on-site inspections
- Full-time monitoring of electrical facilities with a multi-functional central monitoring system



Topics of this presentation

- **Configuration of typical non-utility electric installations**
- **What do we mean by deterioration of high-voltage equipment?**
- **Examples of accidents caused by deterioration**
(Data from the Chubu Electrical Safety Services Foundation)
- **Statistics of accidents with non-utility electric installations**
(Data from the Chubu Electrical Safety Services Foundation from 2015 to 2017)
- **Our efforts for encouraging facility renewals (1)**
- **Transition of deterioration incidents and facility renewals**
- **Our efforts for encouraging facility renewals (2)**



Configuration of typical non-utility electric installations

Power is received from the power company at 6000V and this is transformed on transformers installed at the power-receiving facilities to 100 V, 200 V or other voltage for use in specific applications. A variety of equipment is installed on the on-site poles and power-receiving facilities.

Receives power from power company at 6000 V

Point of responsibility demarcation

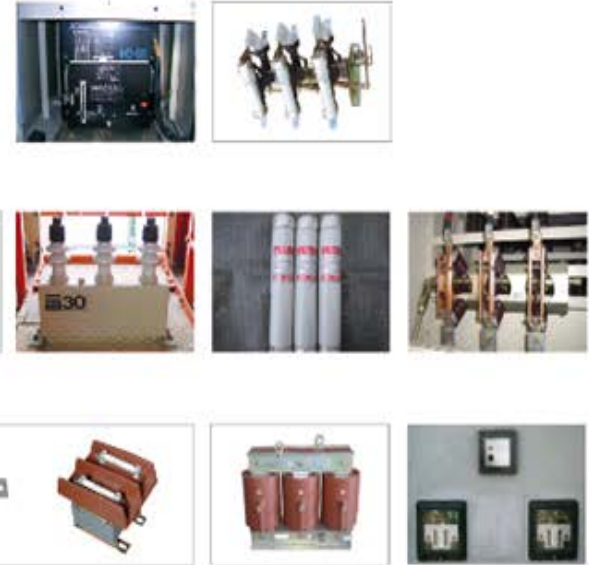
On-site pole

[1] High-voltage switch (Installed on on-site pole)

[2] High-voltage cable

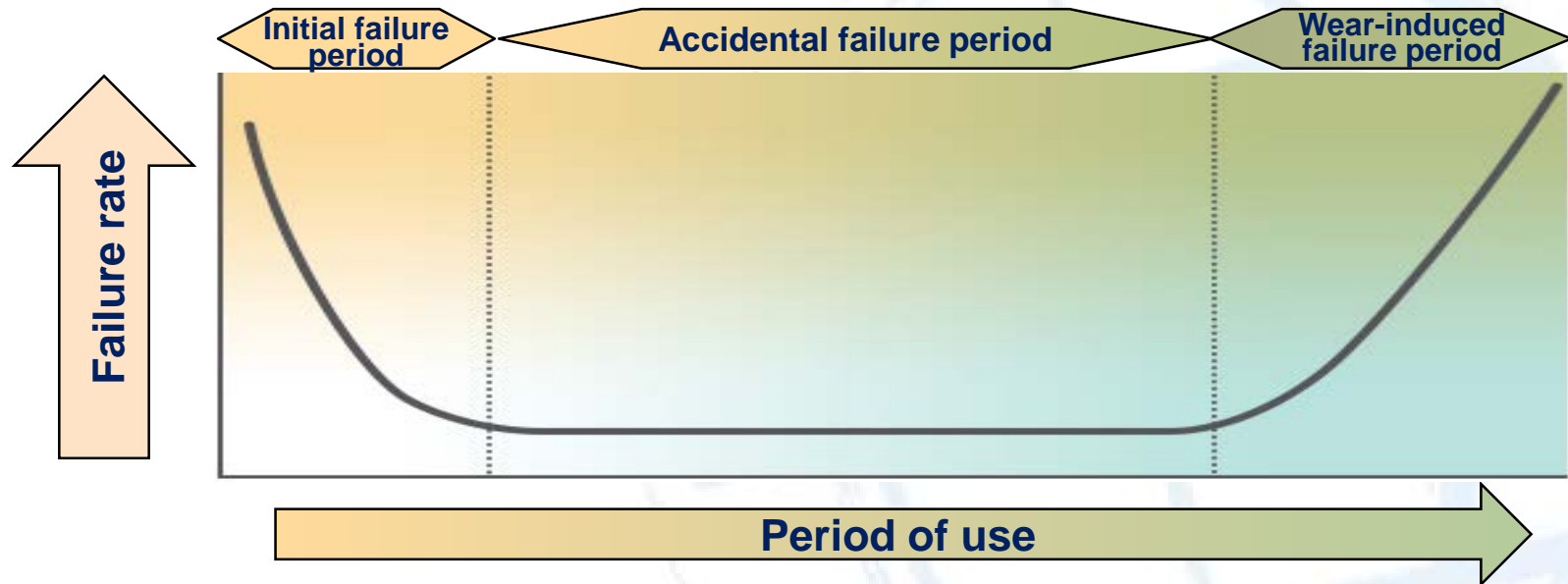
Power-receiving facility

- [3] High-voltage circuit breaker
- [4] High-voltage switch
- [5] Transformer
- [6] Other high-voltage equipment





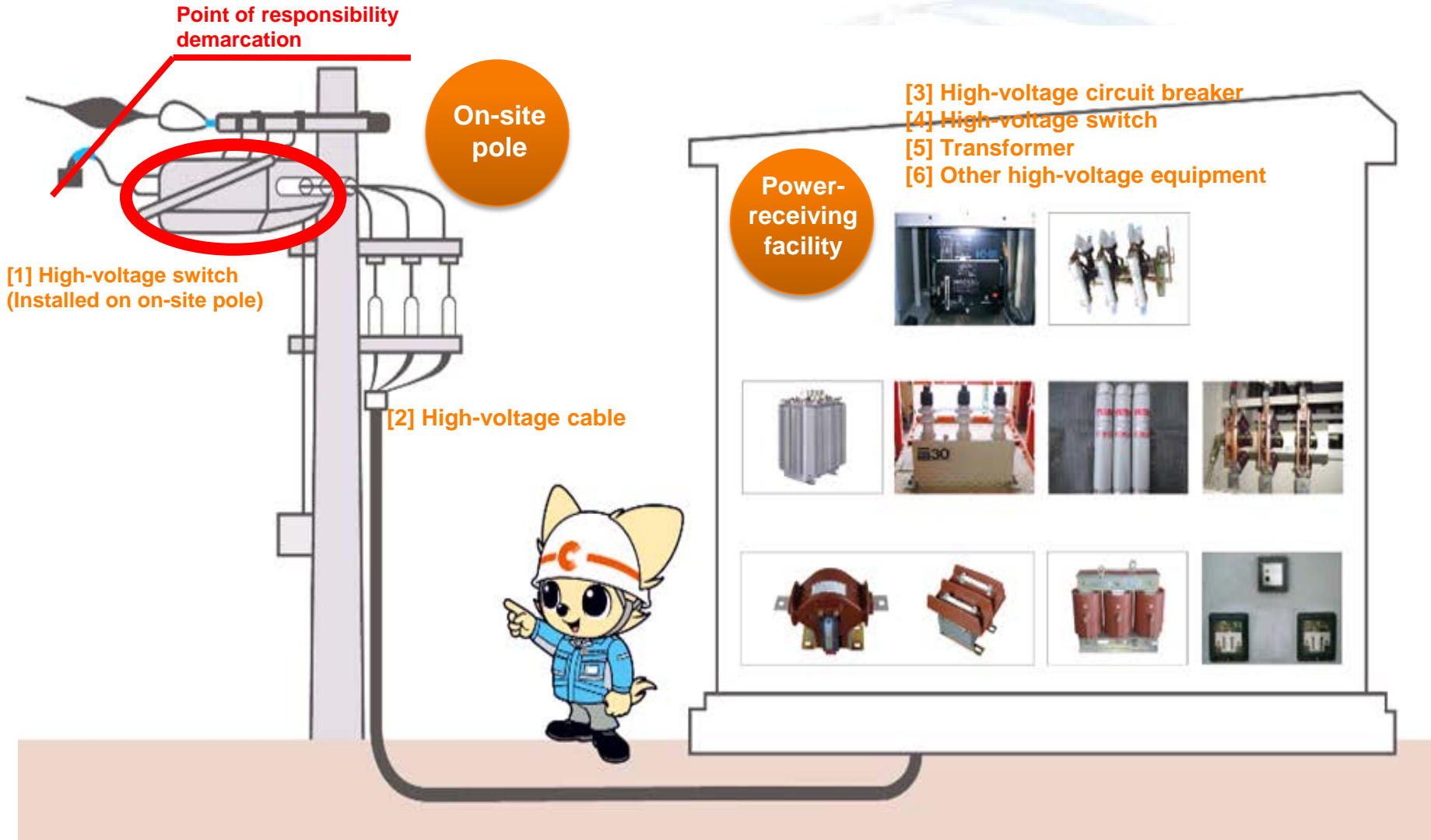
- Deterioration of high-voltage equipment refers to:



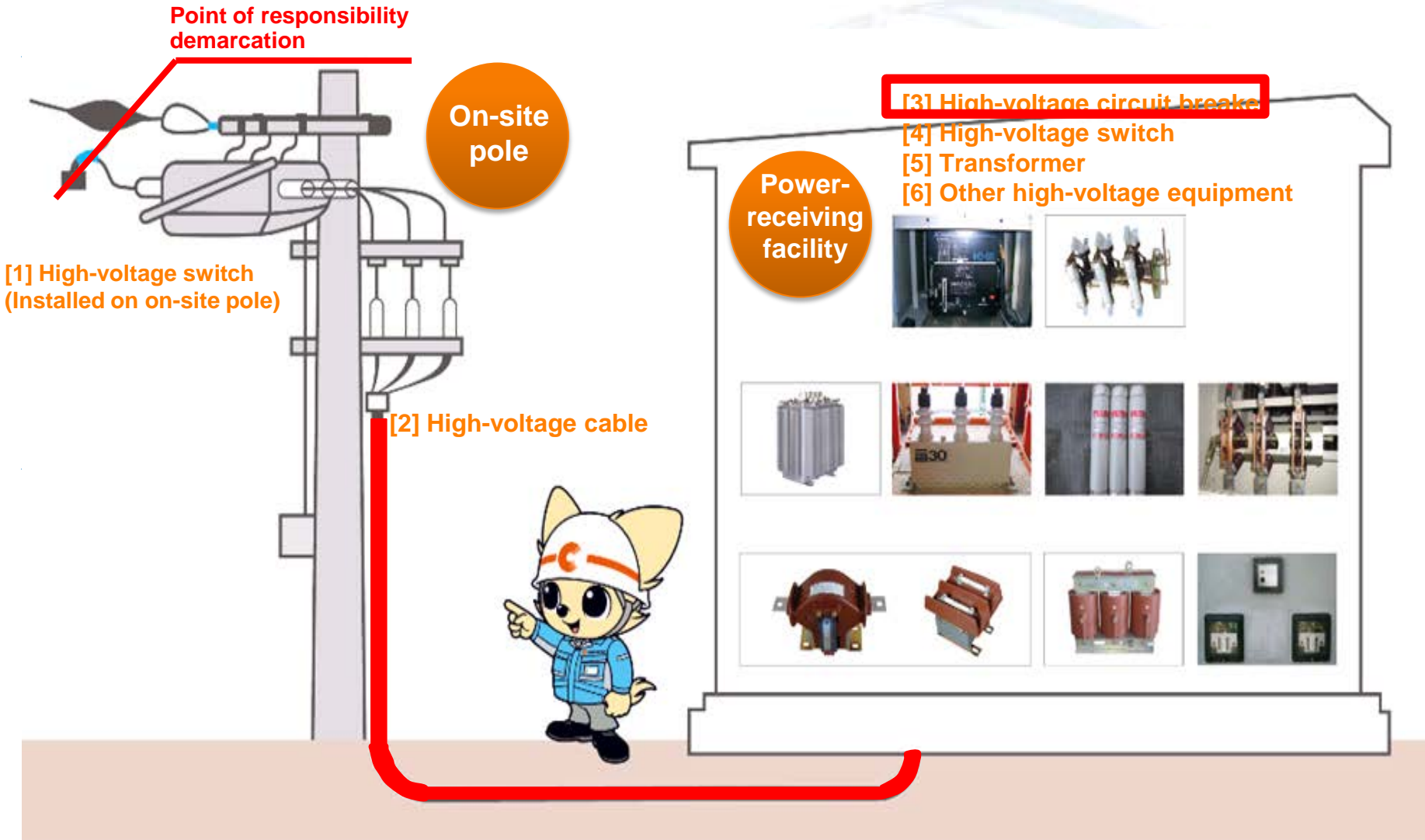
Although faulty construction at the time the facility is newly installed is one risk factor in the context of facility accidents, other than that, proper checkups and maintenance can go a long way in terms of reducing the risks of accidents and failures.

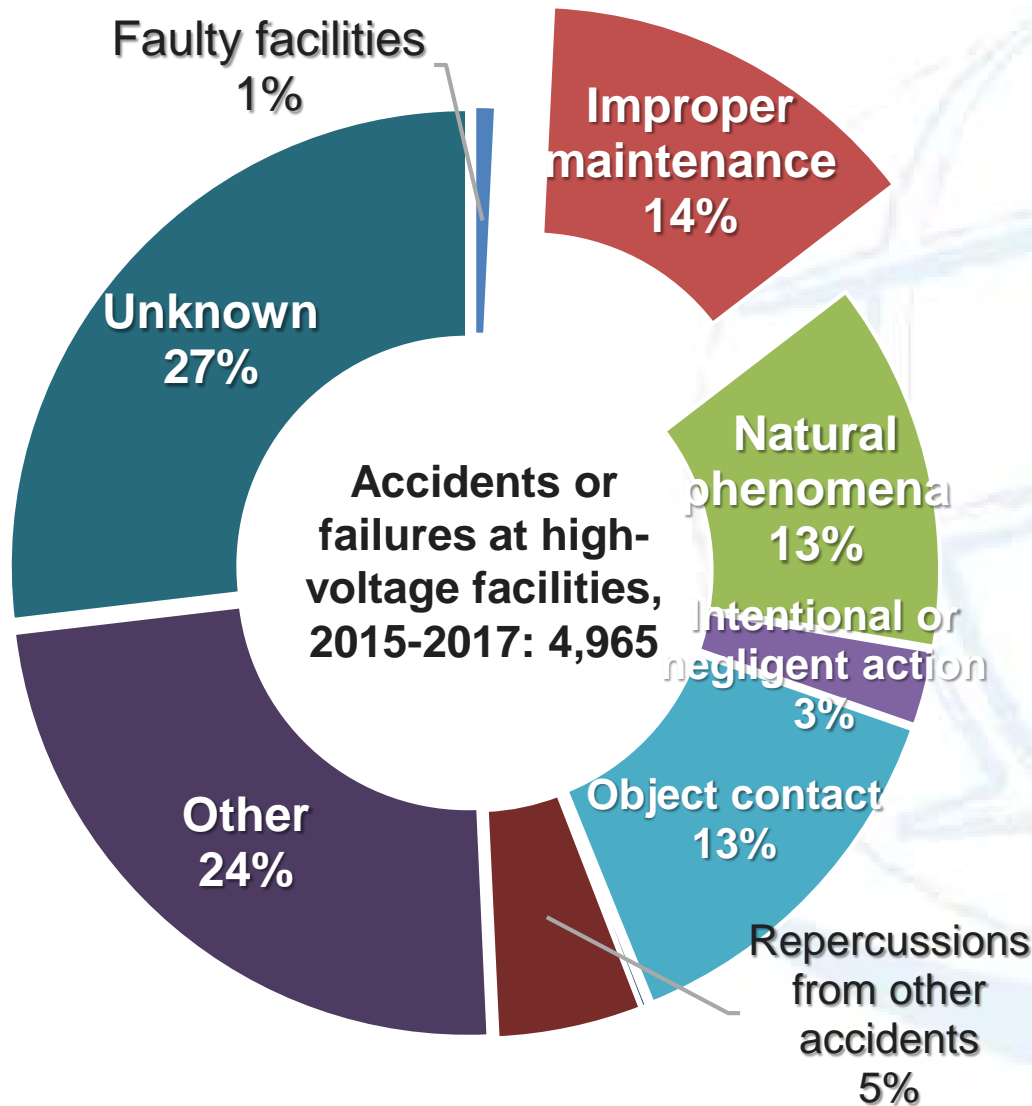
That being said, if high-voltage equipment or other equipment is used beyond their service life, the chances of insulation degradation or mechanical failure on the equipment itself will increase, so the use of high-voltage equipment for long periods of time will tend to increase the occurrence of power outages and other incidents.

Examples of accidents caused by degradation



Examples of accidents caused by degradation

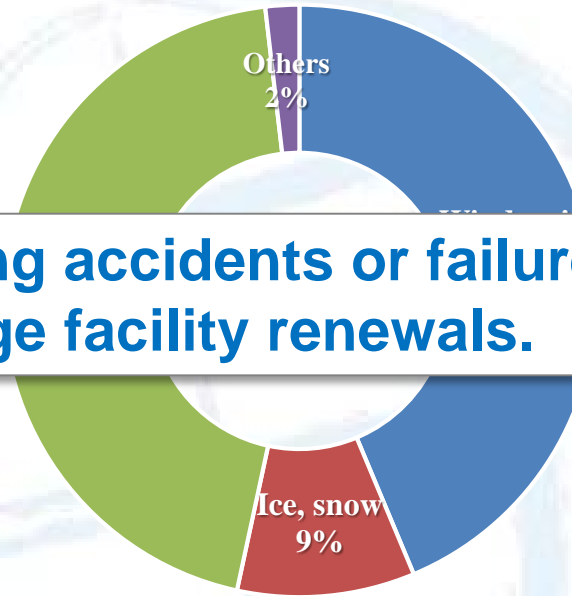
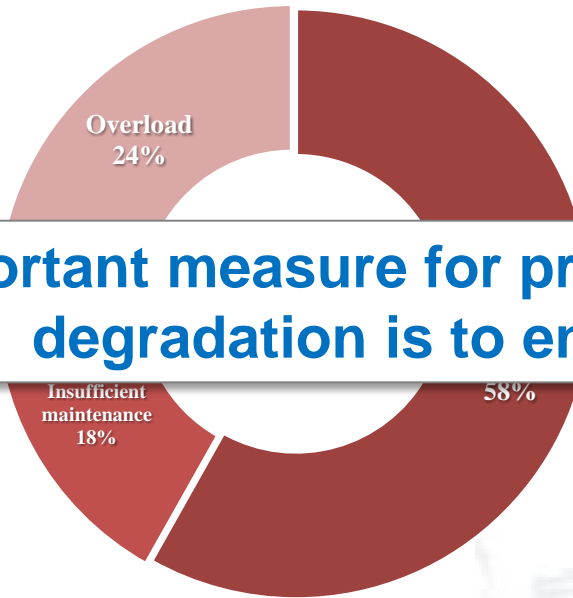




A total of 4,965* accidents or failures with high-voltage facilities used in non-utility electric installations occurred between Apr. 2015 and Jan. 2018.

While the causes of these accidents or failures have been determined for roughly 70% of the cases, we can also see that there was a large percentage of incidents, roughly 30%, where the causes could not be identified, such as due to the destruction of the potential causes of the accident.

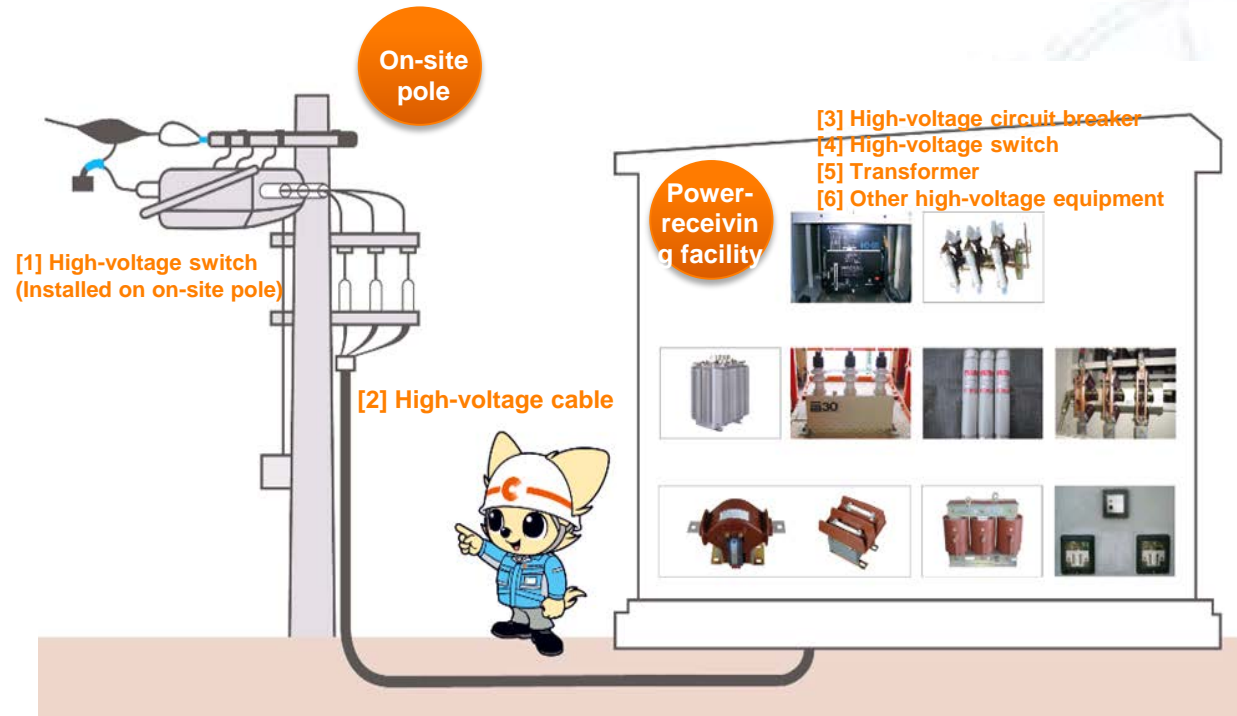
* This number represents the number of incidents that occurred at customer sites where the Chubu Electrical Safety Services Foundation had been conducting checkups.



An important measure for preventing accidents or failures from degradation is to encourage facility renewals.

Cause of accident	Specific example	Preventive measure	Overall percentage
Improper maintenance	Deterioration	Update facility	14%
Natural phenomena	Lightning strike, wind/rain, flooding	Install lightning arrester.	13%
Object contact	Contact by tree or other object	Cut trees	13%

Our efforts for encouraging facility renewals (1)



Equipment name	Recommended renewal dates
[1] High-voltage switch (Installed on on-site pole)	15-20 years
[2] High-voltage cable	20-25 years
[3] High-voltage circuit breaker	20-25 years
[4] High-voltage switch	20-25 years
[5] Transformer	25-30 years
[6] Other high-voltage equipment	25-30 years

[References]

- [1] "Safety inspection management rules for non-utility electric installations" Apr. 2007, Japan Electric Association
- [2] "Study of recommended renewal dates for generic high-voltage equipment" Sept. 1989, Japan Electrical Manufacturers' Association

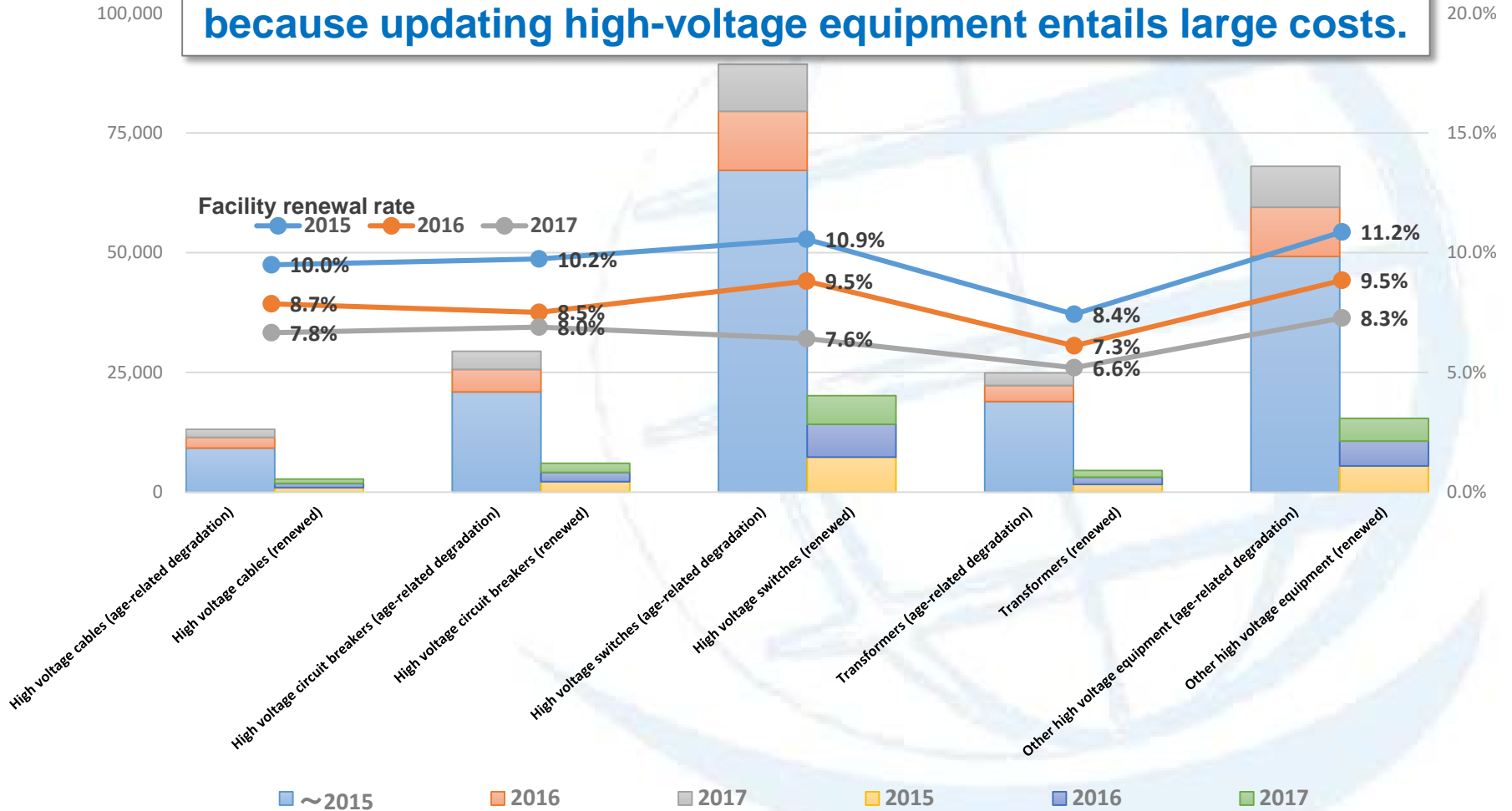
The Chubu Electrical Safety Services Foundation recommends the renewal of high-voltage equipment to customers based on the recommended renewal dates shown in the table at right.

The recommended renewal dates are not based on the functional or performance values guaranteed by the manufacturers of these components, but represent replacement timeframes that are considered to be advantageous from an economic and general standpoint for replacing components that make up the equipment—which have been used under normal conditions and undergone regular maintenance and checkups, but have degraded with age—with new ones.



History of age-related degradation incidents and facility renewals

Only 10% of the degraded equipment are being renewed because updating high-voltage equipment entails large costs.



Time-line chart for electrical facility equipment
Counted from Jan. 2018

Facility category Manufacture date Time-line chart

○: Recommended renewal date ●: Date renewed

変電所名	設備分類	用途区分	製造年月	製造者	型式	改修 依頼済	2017年 以前	2018年	2019年	2020年	2021年	2022年	2023年	2024年	2025年	2026年	2027年	2028年
主変電所	避雷器		1981年1月	*****	*****	有	●											
	構内第一柱開閉器	常用	2002年1月	*****	*****	無	○	○	○	○	○	○	●					
	構内第一柱用GR	構内第1柱用	2002年1月	*****	*****	無	○	○	○	○	○	○	●					
主変電所	変圧器	電灯用	1994年1月	*****	*****	無			○	○	○	○	○	○	●			
主変電所	断路器	主遮断器用	1997年1月	*****	*****	無						○	○	○	○	○	○	●
主変電所	遮断器	主遮断器用	2002年1月	*****	*****	無						○	○	○	○	○	○	●
主変電所	継電器	主遮断器用	2002年1月	*****	*****	無						○	○	○	○	○	○	●
	高压ケーブル	引込用	2002年1月	*****	*****	無						○	○	○	○	○	○	●
主変電所	変圧器	動力用	1997年1月	*****	*****	無						○	○	○	○	○	○	●
主変電所	PF(負荷開閉装置)	変圧器用	2017年5月	*****	*****	無												○

We provide a 10-year timeline chart to our customers that includes the recommended renewal dates for each independent facility as part of our efforts to support our customers in implementing facility renewals in a planned manner.

主変電所	PF(負荷開閉装置)	コンテナ用	2017年4月	*****	*****	無													○
主変電所	断路器	主遮断器用	2002年1月	*****	*****	無												○	○
主変電所	変流器	主遮断器用	2002年1月	*****	*****	無												○	○
主変電所	計器用変圧器	電圧確認用	2003年1月	*****	*****	無													○
主変電所	負荷開閉装置	変圧器用	2016年12月	*****	*****	無													
主変電所	負荷開閉装置	コンテナ用	2017年4月	*****	*****	無													

Our efforts for encouraging facility renewals (2)

- As part of our PR activities, we have created a series of brochures to encourage facility renewals. (Examples of brochures)

Information on backup support for facility upgrade costs

The need to renew facilities



受電設備は、適切な時期に計画更新しましょう

波及事故とは

波及事故は、設置者の責任が軽われ、さまざまな被害が伴う重大な事故なのです。

波及事故でこんな被害が...

部屋が真っ暗に! (あつあつ)

工場のラインが停止! (作業ができません!)

エレベーターが停止! (不安だ)

信号機停止が事故の原因に! (あつあつ)

医療機器の停止で手術に影響も! (大変だー!)

緊急手術!

Information on when to renew



機器・ヒューズ更新のご案内

お客さまの機器・ヒューズの更新時期は迫っていませんか?

高圧機器の種類

- 区分保護継電器 (AOG, SOG)
 - AOG 100A用ヒューズ (F2/F25/F50)
 - AOG 200A用ヒューズ (F50/F100)
- 高圧カタクト(IPC)
- 保線ブレーキ (GR, DGR)
- 保護継電器 (DGR)
- 高圧ケーブル
- 電圧検出器 (VDR)
- 高圧コンタクト (CCT)
- 高圧スイッチ (HTS)
- 高圧分岐装置 (SO)
- 高圧受電ケーブル
- 高圧接地保護電線 (GPE)

高圧電気設備リニューアル費用の分割払い



中部電気保安協会 **無金利** キャンペーン

期間限定 平成31年1月31日施工完了分まで

当協会指定の高圧電気設備更新により、金利を中部電気保安協会が負担します。

【当協会指定の高圧電気設備の例 (例)、設置が済んでいる施設であること、詳細は裏面の対象施設を参照)】

- 区内第一地区分界装置 (SOG)
- 区内第一地区分界装置用 高圧絶縁保護継電器 (DGR)
- 高圧受電引込ケーブル

【適用例】 高圧電気設備の更新費用が96万円、設備費、検査費などを除き、お借入れの場合、**月々20,000円**

こんなお悩みをお持ちのお客さまへ!
停電から必要な設備更新したいけど、今は手元にまとまったお金がない.....

We provide a variety of brochures to create awareness on the need to renew these facilities in a planned manner.

THANK YOU

MERCI



fisuel